Comparative Study of Optical and RF Communication Systems for a Mars Mission
Part II. Unified Value Metrics

H. Hemmati, J. Layland, J. Lesh, K. Wilson, M. Sue, D. Rascoe,
F. Lansing, M. Wilhelm, L. Harcke, C. Chen, and Y. Feria

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA 91109

ABSTRACT

In this Part-II report of the Advanced Communications Benefits study, two critical metrics for comparing the benefits of utilizing X-band, Ka-band and Optical frequencies for supporting generic classes of Martian exploration missions have been evaluated. The first of these is the overall equivalent communications system mass on the spacecraft. The second comparison metric is the overall cost impact. This "overall" cost assessment has considered the costs for both the spacecraft end of the link and the ground end. In both cases the metrics indicate that higher frequency communication bands have favorable mass and cost, particularly at higher data volumes transmitted daily to the earth. The same metrics are also applied to telecommunication for a hypothetical Neptune mission, extrapolating from the designs for the Mars case.